What is claimed is:

1. A signal processing method for use in an adaptive array antenna system of a CDMA (Code Division Multiple Access) mobile communications network, the method comprising the steps of:

(a) initializing a weight vector and a snapshot index;

(b) obtaining gradient of output power of an array antenna to a phase of each of antennas in the array antenna system at every snapshot and determining whether an adaptive gain is added or subtracted depending on the signature of the gradient to update the phase of each antenna; and

(c) determining a weight value for each of the antennas depending on the result of the step (b) at every snapshot to apply the weight value to a signal received at the corresponding one of the antennas.

2. The method as recited in claim 1, wherein the step of (b) includes the steps of:

(d) when a signal is received, computing an output signal based on an equation as:

$$y = \underline{w}^H \cdot \underline{x}$$

(e) computing the gradient of the output power to the phase of each of the antennas based on an equation as:

$$\nabla_m P = \frac{\partial P}{\partial w_m^*} \frac{\partial w_m^*}{\partial \phi_m} = -jx_m w_m^* y^*$$

(f) determining whether an adaptive gain is added to a

phase delay vector value or subtracted from the phase delay vector depending on the signature of the gradient to update the phase delay vector based on an equation as:

$$\underline{\Phi}_{n+1} = \underline{\Phi}_n + \mu \cdot sign(\underline{\nabla} P)$$

3. The method as recited in claim 2, wherein the step of (c) includes the step of (g) updating the weight vector by using the updated phase delay vector based on an equation as:

$$\underline{w}_{n+1} = e^{j\underline{\Phi}_{n+1}}$$

4. The method as recited in claim 3, further comprising the steps of:

(h) repeating the steps of (d) to (g) after a next signal received to perform signal processing over the signal at every snapshot.

5. The method as recited in claim 4, wherein the adaptive array antenna system is a one-dimensional array antenna system.

6. The method as recited in claim 4, wherein the adaptive array antenna system is a two-dimensional array antenna system.

7. The method as recited in claim 5, wherein the number of computations is totally of the order of 4N including computation of the order of N for computing the output signal, computation of the order of 2N for computing the gradient of

the output power and computation of the order of N for computing the phase delay vector, when the number of antennas is N.

8. The method as recited in claim 6, wherein the number of computations is totally of the order of $4N^2$ including computation of the order of N^2 for computing the output signal, computation of the order of $2N^2$ for computing the gradient of the output power and computation of the order of N^2 for computing the phase delay vector, when the number of antennas is N.

9. A computer readable recording medium for storing a program for implementing, in a CDMA adaptive array antenna system having a processor, to maximizing transceiving gain only in a direction toward a target mobile station during transceivng a signal between a base station and the mobile station, the functions of:

(a) initializing a weight vector and a snapshot index;

(b) obtaining gradient of output power of an array antenna to a phase of each of antennas in the array antenna system at every snapshot and determining whether an adaptive gain is added or subtracted depending on the signature of the gradient to update the phase of each antenna; and

(c) determining a weight value for each of the antennas depending on the result of the step (b) at every snapshot to apply the weight value to a signal received at the

corresponding one of the antennas.

10. A computer readable recording medium for storing a program for implementing, in a CDMA adaptive array antenna system having a processor, to maximizing transceiving gain only in a direction to a target mobile station during transceivng a signal between a base station and a mobile station, the functions of:

(a) initializing a weight vector and a snapshot index;

(b) when a signal is received, computing an output signal based on an equation as:

$$y = \underline{w}^H \cdot \underline{x}$$

(c) computing the gradient of the output power to the phase of each of the antennas based on an equation as:

$$\nabla_m P = \frac{\partial P}{\partial w_m^*} \frac{\partial w_m^*}{\partial \phi_m} = -jx_m w_m^* y^*$$

(d) determining whether an adaptive gain is added to a phase delay vector value or subtracted from the phase delay vector value depending on the signature of the gradient to update the phase delay vector based on an equation as:

$$\underline{\Phi}_{n+1} = \underline{\Phi}_n + \mu \cdot sign(\underline{\nabla} P)$$

(e) updating the weight vector by using the updated phase delay vector based on an equation as:

$$\underline{w}_{n+1} = e^{j\underline{\Phi}_{n+1}}$$

(f) repeating the steps of (d) to (g) after a next signal received to perform signal processing over the signal at every

snapshot.